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| 10/804,714 | 03/19/2004 | Carlos Abad | 126888-1 | 7505 |
| 23413 | 7590 | 11/08/2004 | EXAMINER | |
| CANTOR COLBURN, LLP 55 GRIFFIN ROAD SOUTH BLOOMFIELD, CT 06002 | | | BOYKIN, TERRESSA M | |
| | | | ART UNIT | PAPER NUMBER |
| | | | 1711 | |
| DATE MAILED: 11/08/2004 | | | | |

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/804,714

Applicant(s)

ABAD ET AL.

Examiner

Terressa M. Boykin

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 19 March 2004.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-27 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-27 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 6/04.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date: _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1- 27 are rejected under 35 U.S.C. 102(b) as being anticipated by US

6486294 see abstract, cols. 1-6, examples 1-6, tables 4 and claims 1-29, 40-4961-70.

Applicants' claim a polycarbonate composition comprising a chloride, sulfate, phosphate or a combination of two or more of the forgoing ionic species in an amount of zero to about 100 parts per billion based on the total weight of the polycarbonate.

US 6486294 discloses a poly(carbonate-co-ester) block copolymer is synthesized using synthetic strategies that can be incorporated into conventional melt facilities that are commonly used in the production of polycarbonate polymers. The polycarbonate block of the poly(carbonate-co-ester) copolymer is derived from a polycarbonate reaction mixture in methylene chloride comprising an aromatic dihydroxy compound and a carbonic acid diester, such as bisphenol A and diphenyl carbonate, respectively.

With regard to claims 1 and 2 note that reference discloses the presence of a phenol, carbonic diester aromatic dihydroxy compounds or combinations of two or more thereof, note that the reference discloses the use of the diarylesters prepared according to the method outlined in section I of the specification in a melt polymerization process in which dihydric phenol and a diester of carbonic acid are reacted along with the

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diarylester, which is incorporated into the backbone of the polymer.

With regard to the weight average molecular weight as claimed, note that the reference discloses that It is desirable for the poly(carbonate-co-ester) to have a molecular weight of 10,000 to 100,000 g/mol as measured by GPC and relative to polystyrene standards, preferred is 20,000 to 80,000 g/mol, and most preferred is 25,000 to 60,000. The molecular weight M_w was determined to be 5.10.times.10⁴ g/mol via gel permeation chromatography (GPC) using a 1 mg/ml polymer solution in methylene chloride versus polystyrene standards. Thus, in view of the above, the disclosed molecular weight overlaps the claimed range of 40,000 to about 90,000 dalton.

Optionally, after the transesterification of the diaryl carbonate and the dicarboxylic acid, the reaction product may be further purified to remove residual diaryl carbonate and acid. In one embodiment, the reaction product is dissolved in from about 1 to about 3 weight equivalents of an organic solvent. Suitable organic solvents include, but are not limited to methanol; and a methanol/methylene chloride solution. Note that the methylene chloride solution would impart ionic species to the mixture from zero to about 100 parts per billion based on the total weight of the polycarbonate. However, it is noted that the ionic species in an amount of zero is inclusive of the ionic species not being present.

The reference also relates to the use of the diarylesters prepared according to the method outlined in section I of the specification in a melt polymerization process in which dihydric phenol and a diester of carbonic acid are reacted along with the diarylester, which is incorporated into the backbone of the polymer. Residues of dihydric phenols which are useful in preparing the polyester carbonate. Suitable dihydric phenols of the reference include, but are not limited to, BPA; 2,2-bis(3,5-dibromo-4-hydroxyphenyl)propane; 2,2-bis(3,5-dimethyl-4-hydroxyphenyl)propane; 1,1-bis(4-

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hydroxyphenyl)cyclohexane; 1,1-bis(3,5-dimethyl-4-hydroxyphenyl)cyclohexane; 1,1-bis(4-hydroxyphenyl)decane; 1,1-bis(4-hydroxyphenyl)propane; 1,1-bis(4-hydroxyphenyl)cyclodecane; 1,1-bis(3,5-dimethyl-4-hydroxyphenyl)cyclododecane; 4,4-dihydroxyphenyl ether; 4,4-thiodiphenol; 4,4-dihydroxy-3,3-dichlorodiaryl ether; 4,4-thiodiphenol; 4,4-dihydroxy-3,3-dichlorodiaryl ether; 4,4-dihydroxy-2,5-dihydroxydiaryl ether; BPI; 1,1-bis(4-hydroxyphenyl)-1-phenylethane; 1,1-bis(3-methyl-4-hydroxyphenyl)-1-phenylethane, and mixtures thereof. In one embodiment, the residues of dihydric phenol in the polycarbonate comprise 100 mol % of residues derived from BPA.

As the diester of carbonic acid, various compounds may be used, including, but not limited to diaryl carbonate compounds, dialkyl carbonate compounds and alkylaryl carbonate compounds. Suitable diesters of carbonic acid include, but are not limited to, diaryl carbonate; bis(4-t-butylphenyl)carbonate; bis(2,4-dichlorophenyl)carbonate; bis(2,4,6-trichlorophenyl)carbonate; bis(2-cyanophenyl)carbonate; bis(o-nitrophenyl)carbonate; ditolyl carbonate; m-cresol carbonate; dinaphthyl carbonate; bis(diaryl)carbonate; diethylcarbonate; dimethyl carbonate; dibutyl carbonate; dicyclohexyl carbonate; and mixtures thereof. Of these, diaryl carbonate is preferred. If two or more of these compound are utilized, it is preferable that one is diaryl carbonate. (note also applicants claim 10).

Note with regard to the melt volume rate note that FIG. 1 shows the schematic of a typical polycarbonate melt facility used in the production of the poly(carbonate-co-ester); and FIG.2 shows the comparative melt viscosity of copolymers in accordance with the reference and polycarbonate homopolymers lacking the polyester component.

With regard to applicants' claims 3 and 4 note that the reference discloses that polyfunctional compounds may be utilized. Suitable polyfunctional compounds used in the polymerization of branched polycarbonate include, but are not limited to, 1,1,1-tris(4-

hydroxyphenyl)ethane, 4-[4-[1,1-bis(4-hydroxyphenyl)-ethyl]-dimethylbenzyl], trimellitic anhydride, trimellitic acid, or their acid chloride derivatives. Suitable endcapping agents include, but are not limited to phenol, p-tert-butylphenol; p-cumylphenol; p-cumylphenolcarbonate; undecanoic acid, lauric acid, stearic acid; phenyl chloroformate, t-butyl phenyl chloroformate, p-cumyl chloroformate, chroman chloroformate, hydrocardanol, nonyl phenol, octyl phenol; nonyl phenyl chloroformate or a mixture thereof. Furthermore, mixed carbonates and esters composed of endcappers from the list above along with phenol or alkylsalicylates are acceptable. Note also claims 7, 34, 55, 65 of the reference.

With regard to claims 5 and 6 note the reference discloses that the endcapping agent is preferably present in amounts of about 0.01 to about 0.20 moles, preferably about 0.02 to about 0.15 moles, even more preferably about 0.02 to about 0.10 moles per 1 mole of the dihydric phenol.

With regard to claims 7 and 8 as written, as noted in the rejection above, the presence of either the chloride, sulfate or phosphate or a combination of two or more may be zero.

With regard to claim 9, the reference discloses monomers DPC (25.30 g; 0.118 mol) and BPA (24.55 g; 0.107 mol) and the diacid polyester prepolymer (Prepolymer A, 1.08 g) were prereacted with a catalyst for 1 hour at 230.degree. C. 1 atm of nitrogen in a batch reactor tube. Tetramethylammonium hydroxide (TMAH) and NaOH served as catalysts and were added to the reaction mixture as an aqueous solution (100 .mu.L) in the molar ratios of 2.5×10^{-4} for TMAH and 1.5×10^{-6} or NaOH relative to BPA. after the prereaction, the polymerization reaction was conducted under increasing temperature

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and decreasing pressure as a function of time according to the following reaction profile in Table 2:

| TABLE 2 | | |
|------------|--------------|--------------|
| Time (min) | Temp. (° C.) | Pres. (mbar) |
| 10 | 180 | 1000 |
| 60 | 230 | 100 |
| 30 | 270 | 20 |
| 30 | 300 | 0.5-1.6 |

After the final reaction stage at 300 C. and 0.5 -1.6 mbar, butyl tosylate was added in a toluene solution as a quenching agent in a molar ratio of 6 times the molar concentration of NaOH. The copolymer product was purified by dissolving it in chloroform and followed by precipitation with methanol. The product was isolated by filtration and dried under vacuum at 50 C. Differential scanning calorimetry (DSC) indicated a glass transition temperature (T_g) of 133 C. The molecular weight M_w was determined to be 5.10×10^4 g/mol via gel permeation chromatography (GPC) using a 1 mg/ml polymer solution in methylene chloride versus polystyrene standards. The molar ratio of reactants for BPA, DPC and a diacid polyester prepolymer in this example is given by the following expression: $DPC = 1.08 \cdot (BPA + 2 \cdot \text{acid})$. Proton and carbon NMR of the purified polymer confirmed that the polyester prepolymer was chemically incorporated and that the structure was that of a block copolymer and that there was less than 1.3% by weight of unincorporated polyester prepolymer.

With regard to claim 11, as noted above the reference discloses suitable dihydric phenols of the reference include, but are not limited to, BPA; 2,2-bis(3,5-dibromo-4-hydroxyphenyl)propane; 2,2-bis(3,5-dimethyl-4-hydroxyphenyl)propane; 1,1-bis(4-hydroxyphenyl)cyclohexane; 1,1-bis(3,5-dimethyl-4-hydroxyphenyl)cyclohexane; 1,1-

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bis(4-hydroxyphenyl)decane; 1,1-bis(4-hydroxyphenyl)propane; 1,1-bis(4-hydroxyphenyl)cyclodecane; 1,1-bis(3,5-dimethyl-4-hydroxyphenyl)cyclododecane; 4,4-dihydroxyphenyl ether; 4,4-thiodiphenol; 4,4-dihydroxy-3,3-dichlorodiaryl ether; 4,4-thiodiphenol; 4,4-dihydroxy-3,3-dichlorodiaryl ether; 4,4-dihydroxy-2,5-dihydroxydiaryl ether; BPI; 1,1-bis(4-hydroxyphenyl)-1-phenylethane; 1,1-bis(3-methyl-4-hydroxyphenyl)-1-phenylethane, *and mixtures thereof*.

With regard to claims 12 note example 1 and table 2 discloses a catalysts, temperature of about 180 to 300 C and from 0.5 to 1013 mbar which overlaps applicants' claimed invention.

With regard to applicants claim 25, note that the copolymer product was quenched, purified and analyzed as detailed in Example 1.

With regard to applicants' claim 26 note although minimal devolatilizing occurs it is infact disclosed therein. Note examples 1-6.

With regard to applicants' claims 15, 17, 18, 19, and 27 note examples 1-6.

With regard to applicants' claim 16, note that according to applicants' recited claim 1 the ionic species may or may not be zero and thus not be present.

Thus the reference discloses a polycarbonate prepared from the same components as claimed by applicants. Thus in view of the above, there appears to be no significant difference between the reference and that which is claimed by applicant(s). Any differences not specifically mentioned appear to be conventional. Consequently, the claimed invention cannot be deemed as novel and accordingly is unpatentable.

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35 USC 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claim 24 is rejected under 35 U.S.C. 103(a) as being unpatentable over USP 6486294 in view of US 6271290.

With regard to applicants' claim 24, the reference **USP 6486294** discloses a polycarbonate prepared from the same components as claimed by applicants except for the particular sulfur containing quenching agent. **US 6271290** provides a method for making a polycarbonate composition wherein the polycarbonate is prepared by melt synthesis using a sulfur-containing acid compound to at least partially quench the melt catalyst. It would have been obvious to one having ordinary skill in the art at the time the invention was made to employ the particularly disclosed sulfur-containing quenching agent to partially quench the melt catalyst since such method is disclosed as being an effective and inexpensive means.

Claims 13-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over USP 6486294 in view of US 6608165 see abstract, cols. 1-4, claims 1-4.

With regard to claims 13 and 14 note the reference discloses a polycarbonate prepared from the same components as claimed by applicants except for the particular metal(s) based on the total weight of the aromatic dihydroxy compound. However, **US 6608165** discloses an aromatic polycarbonate and a production process therefor.

More specifically, it relates to a process for producing an aromatic polycarbonate from an aromatic dihydroxy compound and a carbonic acid diester, both having a low content of an aldehyde compound, by an ester exchange method and to an aromatic polycarbonate. The reference discloses the use of a nitrogen- containing basic compound or phosphorus-containing basic compound in such an amount that it does not exceed 20 times Fe: the total content of iron contained in the dihydroxy compound and the carbonic acid diester as raw materials which is particularly effective. The amount is particularly preferably such that it does not exceed 20 times $\text{Fe}^* + 150$, having excellent color and stability obtained by the above process. Thus, it would have been obvious to one having ordinary skill in the art at the time the invention was made since it has been found that such an amount improves the color of the obtained.

Claims 21, 22, 23 are rejected under 35 U.S.C. 103(a) as being unpatentable **over USP 6486294** in view of **US 6509435** see abstract, cols. 1-4 and examples.

With regard to applicants' claims 21-23, the reference **USP 6486294** discloses a polycarbonate prepared from the same components as claimed by applicants except for the particular catalyst system as claimed.

However, **US 6509435** discloses a method for preparing an aromatic polycarbonate, which comprises polycondensing an aromatic dihydroxy compound comprising mainly bisphenol A and a carbonic acid diester in the presence of, as an ester exchange catalyst comprising:

an alkali metal compound and a nitrogen-containing basic compound and/or a phosphorus-containing basic compound and, as a co-catalyst, a sulfur-containing compound, the alkali metal compound being used in an amount of 1.times.10.sup.-7 to

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1.times.10.sup.-5 equivalent in terms of alkali metal atoms and the nitrogen-containing basic compound and/or the phosphorus-containing basic compound being used in a total amount of 5×10^{-5} to 1×10^{-3} equivalent in terms of nitrogen atoms and/or phosphorus atoms based on 1 mol of the aromatic dihydroxy compound, and the sulfur-containing compound being used in an amount of 0.1 to 100 atoms in terms of sulfur atoms based on 1 atom of the alkali metal of the alkali metal compound,

so as to form the aromatic polycarbonate of claim 1 of the reference above.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to employ the particularly claimed catalyst as disclosed by applicants; in claims 21-23 in view of the disclosure in US 6509435 since such catalyst system provides for a polycarbonate having melt molding without adding a heat resistant stabilizer and suitable for the melt molding of a thin product, production method and molded products thereof.

Objected Claims

Claims are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Double Patenting

Claims 1-27 are rejected under the judicially created doctrine of double patenting over claims 1, 8-12 of U. S. Patent No. **USP 6482877** since the claims, if allowed, would improperly extend the "right to exclude" already granted in the patent.

The subject matter claimed in the instant application is fully disclosed in the patent and is covered by the patent since the patent and the application are claiming common subject matter, as follows: **USP 6482877** claims a process for preparing a

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polycarbonate resin comprising: (A) melt polycondensing a bisphenol and a carbonic acid diester in the presence of an alkaline catalyst to form a reaction product, and subsequently adding a sufficient amount of sulfur-containing acidic compound to neutralize or weaken said catalyst, thereby forming a reaction product, (B) adding to said reaction product, (i) phosphorous acid (ii) a sulfur-containing acidic compound having a pKa of less than 3, or its derivative, and (iii) an ester derived from a mono-fatty acid of 10 and 22 carbon atoms and a polyhydric alcohol, wherein, in said resin, with respect to said reaction product, the content of phosphorous acid is 0.1 to 10 ppm and the content of the ester is 50 to 1,000 ppm and wherein the sulfur-containing acidic compound is added to said reaction product in two or more increment.

Furthermore, there is no apparent reason why applicant was prevented from presenting claims corresponding to those of the instant application during prosecution of the application which matured into a patent. See *In re Schneller*, 397 F.2d 350, 158 USPQ 210 (CCPA 1968). See also MPEP § 804.

Claims 1-27 are rejected under the judicially created doctrine of double patenting over claims 1 and 7 of U. S. Patent No. **6303735** since the claims, if allowed, would improperly extend the "right to exclude" already granted in the patent.

The subject matter claimed in the instant application is fully disclosed in the patent and is covered by the patent since the patent and the application are claiming common subject matter, as follows: **USP 6303735** discloses a polycarbonate production method, comprising: subjecting a dihydroxy compound and a carbonic acid diester to melt polycondensation in the presence of a catalyst which comprises an alkyl

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metal compound or an alkaline-earth metal compound in an amount of 1.times.1.sup.-8 to 1.times.10.sup.-5 mole per mole of dihydroxy compound to form a polycarbonate; adding a sulfonic acid ester compound and a transition metal scavenger to the polycarbonate, wherein the transition metal scavenger comprises a phosphorous acid monoalkyl ester or ethylenediamine tetraacetic acid; and treating the polycarbonate at a reduced pressure.

Furthermore, there is no apparent reason why applicant was prevented from presenting claims corresponding to those of the instant application during prosecution of the application which matured into a patent. See *In re Schneller*, 397 F.2d 350, 158 USPQ 210 (CCPA 1968). See also MPEP § 804.

35 USC 112, Second Paragraph

Claim 1 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

With regard to applicants recited "ionic species in an amount of zero." It is unclear whether the recited ionic species is in fact present or whether applicant's language is directed to the combination thereof.

Correspondence

Please note that the cited U.S. patents and patent application publications are available for download via the Office's PAIR. As an alternate source, all U.S. patents and patent application publications are available on the USPTO web site (www.uspto.gov), from the Office of Public Records and from commercial

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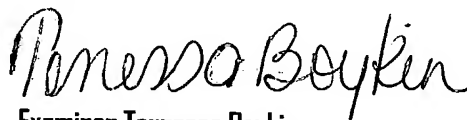
sources. Applicants may be referred to the Electronic Business Center (EBC) at <http://www.uspto.gov/ebc/index.html> or 1-866-217-9197.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Examiner Terressa Boykin whose telephone number is 571 272-1069. The examiner can normally be reached on Monday through Friday from 6:30am to 3:00pm.

The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306. The general information number for listings of personnel is (571-272-1700).

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

tmb



Examiner Terressa Boykin
Primary Examiner
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